FAQs

1. What are the edible byproducts of animal processing?

Edible products are those that may be directly used as food. Blood, brain, liver, heart, trachea, oesophagus, intestines, kidneys, stomachs, sweet bread (thymus and pancreas), tongue, udder, lungs, fat, testes are the edible byproducts. These byproducts should be collected under sterile and clean conditions and should be used immediately or stored at 4 - 7 °C in stainless steel containers. Edible byproducts are a source of essential nutrients. Many of the edible byproducts resemble lean meat in their composition. The protein content of most of the byproducts is slightly lower. But the protein levels in liver, beef tail, ears and feet are closer to lean meat tissue of animal.

2. What about the nutrient composition of edible byproducts?

Edible byproducts contain 10 - 21 % protein, 3 - 18 % fat, and small amount of carbohydrates (0 - 2.1 %). The energy value of edible byproducts is in the range of 95 - 140 calories per 100 g.

3. What are the inedible byproducts of animal processing?

Inedible products are products of industrial importance and are mainly used for animal feeds. Skin / hide, horns, hoof, hair, spleen, bone, head trimmings, feet and tail are the inedible byproducts. Bones should be freed of adhering flesh. The bones should be broken, boiled, dried and stored at room temperatures. Legs, hooves, horns, hair, bristles and tail should be shifted to cool places and transported to processing units within 8 hours. Rendering process has been advocated to process fats, blood, offals, condemned carcasses, feathers, bones and trimmings.

4. What are dual purpose byproducts?

Dual purpose products are those that may or may not be used as human food. Included in this group are blood, bone, intestine, lungs, trachea and oesophagus.

5. What are soft offals?

Soft offals are blood, gut contents, stomachs, intestines, lungs, carcass trimmings, liver, reproductive structures etc. If not utilized for edible purpose, they can go either for the production of meal or hydrolysate. Blood is dried into blood meal and used in animal feeds. Gut contents are used for compost or fertilizer or for biogas production.

6. What are hard offals?

Hard offals are horn, hoof and bones which can be similarly but separately processed into meal and can be and used in animal feeds / fertilizers. Proteins extracted from horns and hooves are used as foams in fire extinguisher.

7. How the blood is used?

Blood is used in many countries as human food either directly or in sausage making. In India, blood is collected from the slaughterhouses and cooked thoroughly before use. For purposes of human consumption, blood must be collected under hygienic conditions from healthy animals. A special hollow knife has been developed for blood collection under sterile conditions particularly from cattle. A similar type of equipment with certain modifications can be developed for collection of blood from sheep and goats. Plasma is used in sausage as binder and also in processed meats. Whole blood can also be used in meat specialties.

8. How intestines are converted in to casings?

Natural casings are made from gastrointestinal tract of cattle, pigs and sheep. There are five distinct layers of tissue in the intestines namely mucosa, sub - mucosa, circular muscle layer, longitudinal muscle layer and serosa – from inside to the outside in order of appearance. The viscera are manually removed from the slaughtered animal. The intestinal tract is then carefully removed from the viscera and processed immediately. There are three essential steps in the preparation of casings.

- i. *Fat removal:* Varying amount of fat is attached to the gut. Removal of fat is done manually using a knife. The fat must be removed as completely possible.
- ii. *Stripping:* The intestinal contents are stripped either by hand or by machine under a spray of water.
- iii. *Sliming:* Sliming is the removal of mucosa. After stripping, small intestines from pig and sheep are first crushed between rollers and then passed between successive rollers or strippers, which remove mucosa, smooth muscle layers and serosa associated with the mucosa leaving only the sub mucosa. Larger casings are turned inside out, passed through crushing rollers and then subsequently passed between rubber rollers under a spray of warm water. The washed and slimed casings are stored overnight in a saturated solution of salt prior to final grading. Casings are graded according to the type, size and quality.
 - 9. What is rendering? Describe different rendering methods.

Thermal processing of byproducts to prepare animal feed ingredients is referred to as rendering.

Three types of rendering are:

Wet rendering: This process is also referred to as steam rendering in which a large tank is loaded with raw material and the tank is sealed. Steam is introduced into the material and maintained at $2 \text{ kg} / \text{cm}^2$ pressure till the fats are freed from the tissues. Three layers form in the tank – fats on top, water layer in the middle and slush at the bottom. Fat and water layers are removed to obtain solid portion, which is dried and pulverized for use as feed ingredient.

Dry rendering: Dry rendering refers to the process in which raw material is cooked in steam jacketed kettle. Dry rendering system is usually more advantageous because of maximum recovery of protein and it does not contribute much to pollution.

Continuous low temperature rendering: The system uses low temperature heating, separation and cooling on a continuous flow basis and is usually regarded as an ideal process.

10. What about the nutrient composition of rendered byproducts?

Rendered by products are rich source of nutrient. They contain 15 – 73 % protein, 1.0 - 2.5 % crude fiber, 1.5 - 18.0 % fat, 2.5 - 7.6 % nitrogen free extract, 0.3 - 25 % calcium and 0.3 - 12 % phosphorus.

11. Write a brief note on animal fat.

The major edible animal fats are lard and tallow. Lard is obtained from pig and tallow from cattle and sheep. Fats are defined in terms of their hardness. Fats with a titer point of 40 °C or higher are called inedible tallow. Fats with a titer less than 40 °C are edible fats. The titer test is a measure of the temperature indicated as a result of the heat of crystallization during cooling of melted fatty acids from the fat. High quality edible fats have low free fatty acids.

12. Write a brief note on bones.

Bones have several uses such as production of ossein, glue, gelatin, bone meal, bone ash *etc*. Bone meal is a rich source of calcium and phosphorous and finds use in animal feeds. Processing of bones is done in a digester. The steam pressure is raised to $1.75 \text{ Kg} / \text{cm}^2$ and maintained for 1 hour. The fat, which liquefies in the process, is allowed to trickle off. A strong solution of gelatin runs off from lower opening of the digester. After extraction of fat and gelatin, the bones remaining in the digester will be in a soft and chalky condition. It is then ground into bone meal, the main component of which is calcium phosphate.

13. What are the special uses of processed byproducts?

Edible raw blood is processed for the preparation of plasma and red cells, which have use as binders in sausages or puddings. Blood albumen is used in leather processing. Inedible blood is converted in to meal for use in animal feed, glues and foam fire extinguishers. Edible raw fat is used for frying, candy and chewing gum and inedible fat in livestock feed, lubricant, soap and candles. Bones are used for the preparation of collagen, gelatin, tallow and bone meal. Neatsfoot oil and feet meal are prepared from cattle feet for use in fine lubricants, leather, glue, gelatin, buttons etc. Rendered stomachs, if not used as human food, can be used as pet foods. Brushes can be prepared from tails. Pancreas, pituitary thymus and thyroids are used for pharmaceutical purposes.

14. Why recovery and processing of byproducts is necessary?

Byproducts constitute 60 - 70% of the slaughtered carcass, of which nearly 40% forms edible and 20% inedible. Improper handling of byproducts leads to their putrefaction resulting to environmental pollution. Value added products can be made from the recovered byproducts. Hence, byproducts processing is important in view of public health and environmental pollution apart from aesthetic reasons.

15. How the byproducts are classified as per EU regulations based on risk to animals, the public and environment.

- **A.** *Category 1 materials:* include animal byproducts posing highest risk (residues of prohibited substances like dioxins or polychlorinated byphenyls). These must be completely disposed by incineration or landfill after appropriate heat treatment.
- **B.** *Category 2 materials:* include those that present a risk of contamination with other animal diseases (animals that die on farm or are killed in the context of spread of disease or at risk of residues of veterinary drugs). These may be recycled for uses other than feeds (biogas, composting, oleo chemical products etc) after appropriate heat treatment.
- **C.** *Category 3 materials:* include byproducts derived from healthy animals. These may be used for feed purposes after appropriate heat treatments in approved plants.